

Remarks

Claim 9 has been amended for grammatical reasons. In particular, claim 9 has been amended to recite “elemental sulfur” throughout the claim and to clarify that the bonding material bonds both to the fiber and to the sulfur. Claims 26 and 27 have been canceled without prejudice. Claims 4, 16, 20, 24, and 28 were canceled without prejudice in previous Amendments. New claim 32 is supported at least by page 2, line 10 to page 3, line 17; page 4, lines 5-28; and page 5, lines 6-14. Support for new claim 33 is found at least on page 4, lines 22-28. New claim 34 is supported at least by page 5, lines 15-19. Support for new claim 35 is found at least on page 5, lines 1-5. New claim 36 is supported at least by page 3, lines 3-28 and page 5, line 27 to page 6, line 25. Support for new claim 37 is found at least on page 6, lines 5-12. New claim 38 is supported at least by page 6, lines 18-19. Support for new claim 39 is found at least on page 6, lines 19-20. New claim 40 is supported at least by page 6, lines 20-25. No question of new matter arises and entry of the above-requested amendments and new claims is respectfully requested.

Claims 1-3, 5-15, 17-19, 21-23, 25-27, and 29-40 are before the Examiner for consideration.

Rejection Under 35 U.S.C. §103(a)

Claims 1-3, 5-8, and 22 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,228,785 to Miller, *et al.* (“Miller”) in view of WO 03/000611 to Gonthier, *et al.* (“Gonthier”) and U.S. Patent No. 4,375,988 to Mueller, *et al.* (“Mueller”). The Examiner asserts that Miller teaches an asphalt-based roofing material that includes a glass fiber substrate coated with asphalt and a surface layer of granules embedded in the asphalt coating. The Examiner admits that Miller fails to disclose the use of a silane-sizing agent for the glass fibers in the asphalt.

In this regard, the Examiner asserts that Gonthier teaches a sizing composition for glass fibers that are used to reinforce matrices for the purpose of manufacturing lightweight roofs. It is asserted that the materials to be reinforced include glass strands in various forms (*e.g.*, continuous or chopped strands, fabrics, continuous or chopped strand mats, etc.). In addition, the Examiner asserts that the size composition may include a film forming polymer (*e.g.*, polyvinyl acetate), lubricants, coupling agents, and an aminosilane. The Examiner concludes that it would have been obvious to one of skill in the art to use the sizing composition of Gonthier to modify the invention of Miller to protect the glass fibers, improve

adhesion between the fibers, and to promote the level of impregnation of the surrounding matrix into the fibers as disclosed by Gonthier.

With respect to a sulfur-containing material, Mueller is cited for assertedly teaching bituminous binders that contain at least one silane and that show excellent improvement of adhesion. The Examiner asserts that the silane is preferably a polysulfide silane and may further comprise a vinyl silane. The Examiner concludes that it would have been obvious to one of skill in the art to modify the invention of Miller with the polysulfide silane of Mueller to improve adhesion as is assertedly taught by Miller.

Applicants' Response

In response to this rejection, Applicants respectfully direct the Examiner's attention to independent claim 1 and submit that claim 1 defines a roof covering that is not taught or suggested within Miller, Gonthier, and Mueller. In addition, Applicants submit that Miller, Gonthier, and Mueller fail to teach the combination of features recited in claim 1.

In particular, Applicants respectfully submit that none of Miller, Gonthier, or Mueller teaches or suggests a roofing mat formed from (1) fibers of a fiber material, where the fibers are coated with a sizing and have properties suitable for forming the roofing mat and (2) an asphalt-based coating material that coats the mat, where the sizing includes a film forming polymer, a coupling agent, a lubricant, and a sulfur-containing material that bonds to the fiber material, where the sulfur-containing material has therein sulfur groups that form cross-links with the asphalt, and where the tear strength of the roof covering is increased by at least about 5% as measured by ASTM D 1922 compared to the same roof covering without the sulfur-containing material in the sizing as required by claim 1.

Looking first at Miller and Gonthier, Applicants submit that neither Miller nor Gonthier teaches or suggests a sizing composition that includes a sulfur-containing material. Indeed, both Miller and Gonthier are silent with respect to any teaching or suggestion of a sulfur-containing material in a size composition.

Turning to Mueller, Applicants submit that Mueller teaches bituminous binders that contain at least one silane. (*See, e.g.*, column 1, lines 22-23 and the Abstract). In addition, Mueller teaches that "the bituminous binder can contain all known silanes". (*See, e.g.*, column 1, lines 23-24 and the Abstract). It is respectfully submitted, therefore, that Mueller clearly teaches the use of a silane in a binder composition. It is respectfully submitted that a binder composition is vastly different from a sizing composition. For instance, a sizing composition is applied to individual glass fibers, typically shortly after they are attenuated as

molten streams of glass. (*See, e.g.*, page 3, lines 1-2 of the present application). In contrast, a binder composition is applied to a web formed of fibers (commonly fibers having been previously coated with a size composition) to form a mat. (*See, e.g.*, page 3, lines 3-15 of the present application). It is respectfully submitted that, as known by those of skill in the art, sizing and binder compositions are formed of different materials and provide different functions. Thus, Applicants submit that even if Mueller was combined with Miller and Gonthier, the combination would not result in the claimed roof covering where the *sizing* includes a sulfur-containing material (*e.g.*, a sulfide silane). Indeed, Miller, Gonthier, and Mueller are silent with regard to any teaching or suggestion of the inclusion of a sulfur-containing material in a sizing composition as is required by claim 1. Accordingly, it is respectfully submitted that claim 1, and all claims dependent therefrom, are non-obvious and patentable.

Additionally, with respect to Mueller, Applicants acquiesce that there is a general disclosure within Mueller of silanes; however, one of skill in the art would have no reason (or motivation), based on the teachings of Mueller, to choose a sulfur-containing silane from the extensive laundry list of silanes recited in Mueller for use in a sizing composition for glass fibers. Applicants submit that if any motivation is present within Mueller, it would be to utilize a silane selected from within the list of silanes for use in a *binder* composition. Mueller simply does not teach or suggest utilizing any of the disclosed silanes in a *sizing* as claimed in claim 1. Further, there is no teaching or suggestion within Mueller (or within Miller or Gonthier) of a chemical bonding of the fiber to the sulfur as required by claim 1. Mueller merely discloses that the binder shows excelled improvement in adhesiveness as a result of the silane content. (*See, e.g.*, column 2, lines 53-55). Therefore, Applicants submit that claim 1 is non-obvious and patentable for this additional reason.

Further, Applicants submit that there is no motivation for one of skill in the art to arrive at the roof covering claimed in claim 1 based on the disclosures of Miller, Gonthier, and Mueller. To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference (or references when combined) must teach or suggest all the claim limitations. (*See, e.g.*, *Manual of Patent Examining Procedure*, Patent Publishing, LLC, Eighth Ed., Rev. 7, August 2008, §2143 citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007)).

It is respectfully submitted that one of ordinary skill in the art would not be motivated to arrive at a sizing that includes a sulfur-containing material based on the teachings of Miller, Gonthier, and Mueller because there is simply no teaching or suggestion within Miller, Gonthier, or Mueller of the inclusion of a sulfur-containing material (or a sulfur-containing silane) in a sizing composition for a glass fiber, as is discussed in detail above. Without some teaching or suggestion, there can be no motivation, and without motivation, there can be no *prima facie* case of obviousness.

In addition, because Miller, Gonthier, and Mueller do not teach or suggest a sizing that a sulfur-containing material, such as, for example, a sulfur-containing silane, Applicants respectfully submit that Miller, Gonthier, and Mueller, alone or in any combination, fail to teach all of the claim limitations set forth in claim 1. Therefore, it is respectfully submitted that a *prima facie* case of obviousness has not been established for this additional reason.

With respect to claims 2-3, 5-8, and 22, Applicants submit that because independent claim 1 is not taught or suggested by Miller, Gonthier, and Mueller and claims 2-3, 5-8, and 22 are dependent upon claim 1 and contain the same elements as claim 1, dependent claims 2-3, 5-8, and 22 are also not taught or suggested Miller, Gonthier, and/or Mueller.

In light of the above, Applicants submit that claims 1-3, 5-8, and 22 are not obvious over Miller in view of Gonthier and Mueller and respectfully request that this rejection be reconsidered and withdrawn.

Rejection Under 35 U.S.C. §103(a)

Claims 9-15, 17-19, 21, 23, 25, and 28-31 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,228,785 to Miller, *et al.* (“Miller”) in view of WO 03/000611 to Gonthier, *et al.* (“Gonthier”) and U.S. Patent No. 4,375,988 to Mueller, *et al.* (“Mueller”) as applied to claims 1 and 6 above, and further in view of U.S. Patent No. 4,339,277 to Schult (“Schult”). The Examiner admits that Miller, Gonthier, and Meuller fail to disclose the use of elemental sulfur in the asphalt matrix.

In this regard, Schult is cited for assertedly teaching an improved sulfur-extended asphalt composition and method for use in making compacted bituminous concrete where sulfur is added to the bituminous composition at levels less than 3.1%. It is asserted that the sulfur provides the asphalt with burning and fire resistance. The Examiner concludes that it would have been obvious to one of skill in the art to modify the invention of Miller to include

the elemental sulfur of Schult to provide an asphalt composition with increased mechanical strength and a reduced dependence upon petroleum products.

The Examiner also asserts that the elemental sulfur will form cross-links with the asphalt following its introduction, which contributes to the mechanical strength gain set forth in Schult. In addition, the Examiner asserts that the relative amount of sulfur in the asphalt coating composition is a result-effective variable affecting the extendibility and the burning and fire resistance of the coated product. The Examiner further asserts that the extendibility and burning and fire resistance of the coated product increase with additional sulfur and that the cost of making the bituminous concrete decreases with less sulfur and asphalt. The Examiner concludes that one of ordinary skill in the art would have been motivated to minimize the amount of sulfur being added to the bituminous concrete, and still attain an increase in bituminous concrete strength and fire resistance. The Examiner states that absent a clear and convincing showing of unexpected results demonstrating the criticality of the claimed percentage, it would have been obvious to one of skill in the art to optimize the amount of sulfur in the coating composition.

Applicants' Response

In response to this rejection, Applicants respectfully direct the Examiner's attention to independent claim 9 and submit that claim 9 defines a roof covering that is not taught or suggested within Miller, Gonthier, Mueller, and Schult. In addition, Applicants submit that Miller, Gonthier, Mueller, and Schult fail to teach the combination of features recited in claim 9.

Applicants respectfully submit that none of Miller, Gonthier, Mueller, and Schult teaches or suggests a roofing mat formed from (1) fibers of a fiber material, the fibers being coated with a sizing, and (2) a coating material that coats the mat, where the coating material consists essentially of asphalt, filler, and elemental sulfur, the elemental sulfur being added to the coating material in an amount from about 0.1% to about 2.0% by weight of the coating material, where the sizing includes a film forming polymer, a coupling agent, a lubricant, and a bonding material that bonds both to the fiber material and to the elemental sulfur, where the elemental sulfur forms cross-links with the asphalt, and where the tear strength of the roof covering is increased by at least about 5% as measured by ASTM D 1922 compared to the same roof covering without the bonding material in the sizing and the sulfur added to the coating material as required by claim 9.

Looking first at Mueller, Applicants respectfully submit that Mueller teaches bituminous binders that contain at least one silane. (*See, e.g.*, column 1, lines 22-23 and the Abstract). As discussed above, a binder composition is vastly different from a sizing composition. Namely, a sizing composition is applied to individual glass fibers, typically shortly after they are attenuated as molten streams of glass, whereas a binder composition is applied to a web of fibers (the fibers having generally been previously coated with a size composition) to form a mat. (*See, e.g.*, page 3, lines 1-15 of the present application). It is respectfully submitted that sizing and binder compositions are formed of different materials and provide different functions. Mueller does not teach or suggest including a bonding material that bonds to the fiber and to the sulfur in the coating material as required by claim 9. Indeed, Mueller is silent regarding such a bonding material in a sizing. Similarly, Miller, Gonthier, and Schult do not teach or even suggest including or adding a bonding material to a sizing composition where the bonding material bonds both to the fiber and to sulfur present in the coating composition. Accordingly, Applicants submit that the combination of Miller, Gonthier, Mueller, and Schult would not result in the roof covering of claim 9 that requires the inclusion of such a bonding material in the sizing. As such, Applicants respectfully submit that claim 9 is non-obvious and patentable.

In addition, Mueller teaches that “the bituminous binder can contain all known silanes”. (*See, e.g.*, column 1, lines 23-24 and the Abstract). Mueller then discloses an extensive list of silanes that are designated as “preferred silanes” in a binder composition. (*See, e.g.*, column 1, line 24 to column 2, line 31). Applicants acquiesce that there is a general disclosure within Mueller of silanes for use in a binder; however, one of skill in the art would have no reason, based on the teachings of Mueller, to choose a silane (*e.g.*, a vinyl silane) as the bonding material in a sizing to bond to the fiber and to the sulfur in the coating composition from the extensive laundry list of silanes recited in Mueller. Applicants respectfully submit that a silane that is capable of binding to both the fiber and the sulfur (*e.g.*, a vinyl silane) as required by claim 9, cannot simply be selected from an extensive and non-exhaustive list of potential silanes without some suggestion or motivation provided within the reference for one of skill in the art to select the particular silane. It is respectfully submitted that simply placing a silane, such as a vinyl silane, in a long list of potential silanes does not provide motivation for one of skill in the art to choose one particular silane over another. (*See, e.g.*, *Manual of Patent Examining Procedure*, Patent Publishing, LLC, Eighth Ed., Rev. 6, August 2007, §2144.08). Indeed, vinyl silanes are cited in the exemplary and

extensive list of silanes in Mueller without any teaching of desired or advantageous features that may be or are provided by selecting and utilizing vinyl silanes, especially when such silanes are used in a *sizing composition*. Vinyl silanes are merely cited as examples within a large number of silanes for use in a *binder composition*. One of skill in the art has no reason to select a vinyl silane over any of the other listed silanes as a bonding material for a sizing composition based on the disclosure of Mueller. Mueller simply does not provide any assistance to one of skill in the art to arrive at the sizing claimed in claim 9. Accordingly, it is respectfully submitted that claim 9 is non-obvious and patentable for this additional reason.

Additionally, it is respectfully submitted that it is only through the teachings of the present application and an impermissible use of hindsight that the inclusion of a bonding material to bond to the fiber and to the sulfur in a sizing composition to form the roof covering of claim 9 may be obtained. Applicants respectfully submit that one of skill in the art would not arrive at a sizing composition that contains the claimed bonding material (e.g., a vinyl silane) without some teaching or suggestion, or without undue experimentation, due to the myriad of silanes and bonding materials known to those of skill in the art and due to the lack of any teaching or guidance within Mueller as to the selection of a particular silane. Mueller simply does not teach or suggest utilizing any of the disclosed silanes in a sizing as claimed in claim 9.

In addition, it is respectfully submitted that one of skill in the art would have no reason or motivation, based on the teachings of Mueller, to choose a vinyl silane from the extensive laundry list of silanes recited in Mueller for use in a *sizing composition* for glass fibers.¹ Mueller clearly teaches the use of a silane in a *binder composition*. Applicants submit that if any motivation is present within Mueller, it would be to utilize a silane selected from within the list of silanes for use in a *binder composition*. Accordingly, it is submitted that the roofing mat containing fibers coated with a sizing including a bonding material that bonds both to the fiber and to the sulfur in the coating material as claimed in claim 9 is non-obvious and patentable for this additional reason.

¹ To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference (or references when combined) must teach or suggest all the claim limitations. (See, e.g., *Manual of Patent Examining Procedure*, Patent Publishing, LLC, Eighth Ed., Rev. 7, August 2008, §2143 citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007)).

Further, Applicants submit that there is no motivation for one of skill in the art to arrive at the roof covering claimed in claim 9 based on the disclosures of Miller, Gonthier, Mueller, and Schult because there is simply no teaching or suggestion within Miller, Gonthier, Mueller, or Schult of the inclusion of a bonding material that bonds both to the fiber and to the sulfur material in a sizing for a glass fiber, as is discussed in detail above. Without some teaching or suggestion, there can be no motivation, and without motivation, there can be no *prima facie* case of obviousness.

In addition, because Miller, Gonthier, Mueller, and Schult do not teach or suggest a sizing composition that includes a bonding material that bonds both to the fiber and to the sulfur material, such as, for example, vinyl silane, Applicants respectfully submit that Miller, Gonthier, Mueller, and Schult, alone or in any combination, fail to teach all of the claim limitations set forth in claim 9. Therefore, it is submitted that a *prima facie* case of obviousness has not been established for this additional reason.

With respect to claims 10-15, 17-19, 21, 23, 25, and 28-31, Applicants submit that because independent claim 9 is not taught or suggested by Miller, Gonthier, Mueller, and Schult and claims 10-15, 17-19, 21, 23, 25, and 28-31 are dependent upon claim 9 and contain the same elements as claim 9, dependent claims 10-15, 17-19, 21, 23, 25, and 28-31 are also not taught or suggested by Miller, Gonthier, Mueller, and/or Schult.

In light of the above, Applicants submit that claims 9-15, 17-19, 21, 23, 25, and 28-31 are not obvious over Miller in view of Gonthier, Mueller, and Schult and respectfully request reconsideration and withdrawal of this rejection.

New Claims 32-40

Although not included in the outstanding rejections, Applicants wish to briefly address the patentability of newly added claims 32-40. In this regard, Applicants submit that new independent claims 32 and 36 define roofing mats that are not taught or suggested by any of the Examiner's cite references. Miller teaches improved impact resistance through a web that bonds to a substrate formed of nonwoven glass fibers through melting. (*See, e.g.*, column 3, lines 35-43; column 4, lines 13-17; and column 5, lines 1-16). In contrast, in both independent claims 32 and 36, a single roofing mat formed from fibers coated with a sizing is utilized in forming the roof covering. Although Applicants have not claimed an improvement in impact resistance, Applicants have achieved improved results (*i.e.*, improved tear strength) with the use of only a single mat. Due to the required utilization of two separate mats in

Miller, namely, the web 26 and the substrate 12 (a nonwoven web), it is respectfully submitted that the combination of Miller with any reference, regardless of its teaching, would not result in the roof covering claimed in claims 32 and 36. Accordingly, it is respectfully submitted that claims 32 and 36, and all claims dependent therefrom, are non-obvious and patentable.

Conclusion

In light of the above, Applicants believe that this application is now in condition for allowance and therefore request favorable consideration.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

If necessary, the Commissioner is hereby authorized to charge payment or credit any overpayment to Deposit Account No. 50-0568 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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